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ABSTRACT

Leaving Money on the Table? Suboptimal Enrollment in the New Social Pension Program in China*

China's recently implemented New Rural Pension Scheme (NRPS), the largest social pension program in the world, was designed to provide financial protection for its rural population and reduce economic inequities. Yet the impact of this program is mitigated if those eligible fail to enroll. This paper examines the extent to which pension-eligible individuals, and their families, make optimal pension decisions. Families are involved in the NRPS decisions because, in most cases, adult children need to enroll as a prerequisite of their parents' receipt of benefits. We examine the decisions of both those eligible for pension benefits (i.e. over 60 years old) and their adult children. We use the rural sample of the 2012 China Family Panel Studies to study determinants of the decision to enroll in NRPS, premiums paid, and time taken to enroll.We find evidence of low and suboptimal pension enrollment by eligible individuals and their families. Suboptimal enrollment takes various forms including failure to switch from the dominated default pension program to NRPS and evidence that families do not make mutually beneficial intra-family decisions. For the older cohort, few individual and family characteristics are significant in enrollment decisions, but village characteristics play an important role. For the younger cohort, more individual-level characteristics are significant, including own and children's education. Village characteristics are important but not as much as for the older cohort. Our finding of suboptimal enrollment is important as it highlights the need for policies to improve enrollment. This paper provides needed information on the extent of the factors relating to suboptimal enrollment.

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1. Introduction

In 2009, China introduced to its rural population the world's largest social pension, the New Rural Pension Scheme (NRPS). This covered population tends to have lower education and lower income and worse health than its urban counterpart. The NRPS was designed to provide the rural elderly, especially those with low income, with basic protection against poverty in old age. The NRPS was also introduced in part due to erosion of the traditional system of intergenerational cohabitation, in which children would provide in-person care for elderly family members and share incomes. The lower rates of cohabitation with children are due to both the large outmigration of younger generations and the persistent decline in the fertility rate. Consequently, the elderly currently need more market-based services to substitute for the lack of in-person family care. Further, the increased life expectancy in China leaves the elderly living alone for more years.[1] Thus, many rural elderly are increasingly likely to suffer from too little support without the rural pension system. However, without a high uptake of NRPS, protection will remain low.

The NRPS was also launched to replace the failed, unsubsidized rural pension program initiated in the 1990s, i.e. the Old Rural Pension Scheme (ORPS). In contrast to ORPS, both the central and local governments generously subsidize the NRPS. The subsidy is particularly robust for those in the special phase-in period at program initiation, allowing elderly persons at the time of local rollout to receive benefits despite never having paid into the system. This special phase-in period provides an important opportunity to study enrollment decisions.

We use the 2012 China Family Panel Studies (CFPS) to explore determinants of the decision to enroll in NRPS, premiums paid, and time to enrollment. This paper empirically investigates the extent to which people respond to the new pension program with optimal financial decisions. To the extent that they do not respond optimally, we also examine who fails to enroll, and why. Specifically, we examine the economic incentives to enroll and factors that could directly and indirectly affect enrollment decisions. The rollout of the program to all counties in China prior to the 2012 survey provides us with the opportunity to observe three key enrollment decisions: to enroll or not, timing of enrollment, and size of individual premium contribution. We examine these decisions both for those eligible for a pension and their adult children. We focus on the latter due to the requirement that children need to enroll to make their elderly parents eligible for NRPS, and because they may also have their own motivations to enroll for their futures.

The *Family Binding Policy* in China requires at least one child (aged 16 years or above, not enrolled in school, and holding rural registration) to enroll in the NRPS to make their elderly parents eligible for pension benefits. Note that a large proportion of elderly parents have multiple children due to the loosely implemented One Child Policy in rural China. The enrolling adult child must pay premiums each year for parents to receive pension payments. We examine separately the incentives and decisions of those over and under the age of 60, due to this important policy and other differences in

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coverage and contribution requirements by age. Specifically, we separately examine individuals over age 60 who have children, and also those between the ages of 45 and 60. We ignore those under 45 for two main reasons: first, they have little incentive to enroll until later in life, even with the *Family Binding Policy*; second, this paper focuses on suboptimal pension choices in the intergenerational context, but those under age 45 often have no eligible adult children to be subject to the *Family Binding Policy*. People above age 60 have straightforward incentives to enroll in NPRS as it is noncontributory for this initial cohort of the elderly. The decisions of people aged 45–60 are more complicated for several reasons. Importantly, their decision to enroll may be affected by the desire to ensure benefits for their parents. If they choose to enroll, they also must decide when to enroll, and at what level of premiums.

We find that only half of the small percentage of childless seniors who could benefit immediately without being subject to the *Family Binding Policy* enroll. Children and their elderly parents could make intergenerational arrangements to enroll, and have immediate pension benefits to both generations, but many fail to do so, thus leaving money 'on the table'. Moreover, a sizable portion of respondents could obtain higher benefits simply by switching from the unsubsidized ORPS (the default program) to the highly subsidized NRPS, but again fail to do so.[2] Perhaps surprisingly, the poorest households (in the bottom quintile) in age cohort 45-60 are less likely to enroll as compared to their richer counterparts. And none of the lowest quintiles enroll more rapidly despite presumably having more to gain in terms of improvement in their well-being.

Our empirical investigation has several notable strengths. First, we contribute to the literature by making the first attempt to examine suboptimal pension enrollment and exploring plausible explanations to the puzzle of low pension enrollment and, more generally, inadequate planning for old age[3]. Second, we contribute to the literature by examining intra-family and intergenerational arrangements as they are key to optimal pension decisions. Our ability to link older parents and children (even those who have migrated) enables us to observe intra-family dynamics. Third, because the 2012 CFPS survey was fielded on average two years after the implementation of NRPS, we can compare the actual enrollment to some clear-cut gains to enrollment that occurred in the initial rollout. In this post-enrollment period, respondents would have had ample time to make decisions. Further, we collect and match county administrative data on pension roll-out with individual's pension choices to obtain precisely measured pension enrollment decisions.

Another contribution of this paper is that while most of the literature on pension

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[2] The similar pattern has been observed in multiple countries where people respond to the complexity inherent in retirement plan choices by simply choosing the default option (Madrian and Shea 2001; Clark et al. 2015).

[3] For example, people often fail to plan adequately for retirement. A sizable fraction of those close to retirement age do not plan for retirement (Lusardi 1999) or make adjustments to consumption and saving (Hubbard et al. 2005); this holds even among respondents with high educational attainment (Ameriks et al. 2003). Employees fail to enroll in a timely manner and fail to obtain the maximum payouts (Campbell 2006; Chalmers et al. 2014). Also, people are uninformed about the characteristics of their pension plans (Mitchell 1988; Gustman and Steinmeier 2001) and leave "$100 bills on the sidewalk" by declining matching retirement contributions that can be immediately withdrawn (Choi et al. 2011).

decisions relates to the developed world, this paper examines pension decisions in a middle-income country. As the country with the world's largest population and pension system, China's experience demands analysis. In addition, the program is growing dramatically as China is currently integrating rural and urban social pensions. Once completed, this unified pension system may serve more than 800 million residents, doubling the current size of the NRPS (Chen 2016). Thus, lessons learned from analysis of the NPRS have an immediate application.

The rest of the paper is organized as follows. Section 2 provides institutional background on the New Rural Pension Scheme. Section 3 discusses the conceptual framework and provides predictions about optimal enrollment decisions. Section 4 introduces the dataset, the analytical sample, variables, and our empirical approach. Section 5 discusses the empirical results. Section 6 concludes and discusses potential explanations and policy implications.

2. Institutional Background: The New Rural Pension Scheme in China

Despite rapid overall economic growth in China, income growth in rural areas has not matched that of urban areas. NRPS was launched to help address this geographical inequity and to protect rural populations against poverty in old age. Officially launched in September 2009, after a few years of piloting in selected areas of the country, the NRPS was to replace ORPS, an older and unsuccessful rural pension program implemented in the 1990s.[4] Since 2009, ORPS has remained in operation but not accepted new enrollees. The two programs are mutually exclusive in enrollment but existing ORPS clients can simply transfer their contributed premiums to the NRPS. In contrast to ORPS, NRPS is subsidized at both provincial and national levels. By 2012, the NRPS had been introduced into all counties of China, thus making more than 400 million eligible for enrollment and providing the potential for nationwide, subsidized old-age support to rural China's elderly population (see Appendix Figure 1). Yet, 5.9 percent of those aged 45–60 and 11.7 percent of those over 60 have not switched from ORPS to NRPS, though NRPS clearly dominates ORPS (Table 1 and Appendix Figure 2).[5]

All residents with rural registration (*Hukou*), aged 16 or above and not in school,

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[4] During the 1990s, China's Ministry of Civil Affairs launched a basic rural social security program, i.e. the Old Rural Pension Scheme (ORPS), in some well-off rural areas (Li 2007). The program stipulated that rural residents had to start contributing premiums to the social pension scheme at age 20 and that they could receive pension starting at age 60. No government subsidies were provided. Due to the lack of subsidies, this program collapsed in many rural areas (Li 2007). According to Shen and Williamson (2010), an interviewed official said ''the system virtually failed, as it required payment solely from farmers, who eventually gave up because of a lack of money.'' In 2007, a total of 9.2 million rural older persons (i.e. enrollees above age 60) nationwide received ORPS pension benefits. Considering that a population of 100 million elders living in rural areas, ORPS benefits only accounted for under 10 percent of rural elders in China (Ministry of Labour and Social Security of China, 2007; National Bureau of Statistics of China, 2007). Since 2009, the New Rural Pension Scheme (NRPS) has been implemented to replace ORPS. Specifically, ORPS has remained in operation but has not accepted new enrollees. The two programs are mutually exclusive in enrollment. ORPS clients can simply transfer their contributed premiums to the NRPS. In contrast to ORPS, NRPS is subsidized at both provincial and national levels (Pension Watch 2013).

[5] Note that even if all were to switch to NRPS, more than 35 percent of the younger cohort and 25 percent of the older cohort would not have enrolled in NRPS.

can voluntarily enroll in NRPS. No cumulative work histories are required[6]. Individuals aged 16–60 at the time of the rollout can establish and contribute to private accounts at varying levels. Such private accounts are funded by and eventually paid to the individual and can be inherited at death. However, those of 60 or over at the time of the local rollout did not have the opportunity to establish private accounts.

Those over age 60 at the time of the rollout were not required to have contributed to the pension system to be eligible for basic pension benefits. However, the *Family Binding Policy* stipulates that they are eligible for basic pension benefits only if at least one of their adult children eligible for the NRPS also enroll. If there is no such adult child, the parent is eligible for benefits by default. People aged between 45 and 60 can contribute for any time period before age 60 to be eligible for pension benefits.[7] For individuals aged 16–44 at rollout, contributions must have been made into the system for at least 15 years before benefits can be received at age 60.

The lowest level of pension premium paid by an individual is 100 CNY per year per person, but wealthier provinces often set higher premium levels, and consequently the premiums paid vary greatly by province. Funding comes in part from the required local government subsidies of 30 CNY per person per year for the first 100 CNY of premiums contributed to the individual account; there is a lower than proportional subsidy for additional premiums contributed. In addition, to compensate for the lower fiscal capacity of local governments in central and western China, the national government finances all basic pension benefits in these regions, compared with only 50 percent of the basic pension benefits in eastern China.

Upon reaching age 60, eligible individuals can receive payments from their government provided account. This basic pension benefit is 55 CNY per month per person in 2012 for almost all survey subjects (Cai et al. 2012; Cheng et al. 2018).[8] They can also receive payments from their private account if they established one. Benefits are paid regardless of working status. Because pension benefits are distributed directly to an individual's bank accounts without a need to claim benefits in person, migration may not discourage enrollment. In rural China, almost all older persons have at least one bank account.

3. Conceptual Framework

NRPS enrollment decisions depend on the expected benefits and costs of the NRPS, which in turn depend on a variety of factors. A key aspect is how generations within each family are linked in enrollment decisions. The generations are naturally linked since in Chinese culture, intergenerational ties are strong, ranging from cohabitation, to older parents providing childcare to their grandchildren, to the role of sons in taking responsibility for their elderly parents. In addition, the rules of NRPS, as

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[6] The lack of a contribution requirement perhaps occurs in part because most rural residents work in the informal sector, with no formal documentation of work contribution.

[7] In order to support the financial stability of NPRS, the government recommends that those aged 45–60 contribute as much as possible to NRPS, although there is no financial incentive for them to do so.

[8] Only in Beijing, Tianjin and Shanghai basic pension benefits were above 55 CNY by the time of survey. This difference is to adjust for cost of living (Chen, Eggleston, Sun 2018). However, the rural population only accounts for a tiny proportion of overall population in these three metropolitans (due to their highest level of urbanization in China) and also in the CFPS rural sample under analysis.

discussed above, require that at least one child enrolls to make the older parents eligible for NRPS, unless the parents are childless. These considerations link the enrollment decisions of both generations not only to their own characteristics but also to those of the other generation. Given the out-migration of children, village characteristics may also affect the decisions of the older parents left behind, because their children are not living nearby.

Below we discuss these and other factors and their potential impact on enrollment decisions. Because both the set of factors relevant to the decisions and their hypothesized impacts will differ somewhat across the two generations, we discuss them separately below but also focus on the commonalities and particularly on the intergenerational linkages.

Individuals over age 60 are the most likely to enroll in NRPS as the program is designed to benefit them. Their benefits to enrollment are greater if they are younger (but at least 60 years old) and if their spouses are also eligible. A pension-eligible spouse may promote enrollment via mutual assistance and income and information sharing within the couple. There may also be gender differences that cannot be predicted and thus need to be determined empirically. The childless over the age of 60 at the time of roll-out have the most clear-cut incentive to enroll: they are immediately eligible for pension payouts but are not required to contribute and are not subject to the *Family Binding Policy*.

For those with children, at least one child must enroll and contribute financially to NRPS. When altruism alone is not enough to encourage enrollment by the adult children, then intra-family or intergenerational agreements might facilitate enrollment. Such agreements could be implicit or explicit, and payments might be non-financial (older parents providing childcare or housing) or financial (giving money to pay for the child's NRPS contribution). The costs and benefits of these arrangements for both generations depend on the ages, number, and gender of both their older parents and their children.

Adult children can play a central, but mixed, role in parents' enrollment decisions for multiple reasons. First, the greater the number of children, the more likely that at least one child enrolls or more children collectively pay pension premiums for their parents' benefits. However, a larger number of children may also reflect stronger informal old-age support that may offset motives for pension enrollment (Packard et al. 2002; Li and Olivera 2005; Auerbach et al. 2007; Ebenstein and Leung 2010). Second, the closer the adult children are to pension eligibility but are not yet eligible, the greater the expected, discounted benefit to them of enrolling, and again, the more willing they might be to enroll[9]. Third, children's out-migration likely weakens emotional and geographical ties to their parents and the ability to make intra-family commitments to enroll parents with the *Family Binding Policy*. All children's out-migration and anticipated obtaining of urban Hukou may also delay their premium contribution in anticipation of no required contribution of children registering with a urban Hukou and

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[9] Yet adult children might resist contributing due to: distrust of the government continuing the program, and of payout levels; skepticism that the parent would redistribute the payouts; lack of financial resources; lack of altruism; and other factors.

their parents receiving basic benefits soon without any premium paid by children. However, this decision is suboptimal as the benefits to parents of immediate enrollment far exceeds the premiums that the children pay. Failure to enroll causes the two generations to forgo their immediate sharable benefits from NRPS. Fourth, better decision-making ability of elders and their children (e.g. higher educational attainment) likely increases a parent's understanding of the benefits of enrolling. Children may play a large role in their parents' decisions, as their education is on average higher than that of their parents.

Financial protection available to older parents could have offsetting impacts on enrollment decisions. Stronger financial protection, such as from their children, spouses, other pension and non-pension income, and health insurance coverage, [10] may financially enable older persons to enroll, and enroll more rapidly. However, such protection may also reduce the benefits of enrolling. Clearly, poor health could increase the demand for both pension income and personal care services, but poor health might also reduce the number of years over which to expect to reap the returns from NPRS. These are potentially offsetting impacts that must be determined empirically.

For the elderly, there is only the potential for financial gain, and no risk of losing money, so trust in government should play little role in enrollment decisions. However, parents might altruistically be concerned about the long-term viability of a system that might put their children's funds at risk (Crabbe 2005; Lei et al. 2013), and thus low trust might reduce the enrollment rate. The net effect is likely to be a small and/or insignificant impact on enrollment decisions.

Village characteristics may influence individuals' pension enrollment decisions, for example, through peer learning and sharing of a village infrastructure to aid the enrollment process. The village may be particularly influential towards childless elders, those whose children have migrated, or who do not have close relations with their children.

Individuals aged 45–59 have incentives to enroll in NRPS, both for their own direct benefit and to help their older parents. While their incentives are similar to the older cohort, their incentives also interact with the enrollment decisions of their parents, and there are additional considerations. Below we consider pension decisions from the perspective of the younger generation. We do not repeat the discussion about intergenerational links in the enrollment decision.

Like the older generation, the younger generation should be more likely to enroll the more years they can reap pension benefits relative to the number of years in which they will have to make payments. Thus, it is the individuals who are older but still under 60 years old who are more likely to enroll. They will have to contribute for fewer years before receiving benefits. They also bear a lower risk of losing benefits if the pension

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[10] Health insurance coverage could serve either as a substitute for or complement to NRPS. It would be a substitute as it could help with both the financial risk and provision of care. It would be a complement for at least three reasons: 1) both serve as a risk reduction approach; 2) health insurance coverage may raise one's life expectancy and expectancy of accruing greater pension benefits (Lei and Lin 2009; Wagstaff et al. 2009; Kimberly et al. 2010; Hu et al. 2012); and 3) both may be due to greater trust in government (Li and Olivera 2005).

system falters. As explained before, having a pension-eligible spouse, having stronger trust in government or better decision-making abilities are all expected to promote pension enrollment, but financial protection may play a mixed role. More parents alive or not all children migrating out are also likely associated with greater enrollment. To the extent that the younger generation, especially migrants, has relatively weak ties to their home communities, the characteristics of the village might not significantly affect their enrollment decisions. Unlike the older parents who are required to have at least one child enroll in order to be eligible to enroll, the *Family Binding Policy* does not apply to the younger parents and their children. Therefore, the number of children in one's family only indicates the extent of informal old-age support that the younger parents receive; thus, more children in the family may dampen pension enrollment. For this age cohort, there may exist gender differences in enrollment, as culturally sons play a larger role in ensuring the well-being of their older parents.

4. Data and Empirical Approach

4.1 Data and Analytical Sample

We use the China Family Panel Studies (CFPS) 2012 national sample to study determinants of the decision to enroll in NRPS, time to enrollment, and for individuals below age 60, premiums paid. The survey covers 42,590 individuals age 0-100 from 14,960 households across 25 provinces of China[11], geographically representing 95% of the Chinese population (Xie and Lu 2015). Because the survey was fielded about two years after the rollout of NRPS, we can observe if, when, and to what extent an individual enrolled in NPRS[12]. The two-year gap allows substantial time for individuals to respond to the program.

Characteristics at the individual, family, and village levels hypothesized to affect enrollment decisions are available in the data set. For individuals, standard socio-economic and demographic characteristics were collected, including education, family structure, age, income and wealth. Data were also obtained on health status, migration, county of residence, and a number of relatively rare variables pertinent to our study such as individual's trust in government. In addition, there is information on whether the individual is enrolled in any other public programs. The family level data have rich information on family composition, including adult children living away from home. For the older cohort, we match these parents to their children even if they were not co-residing. For the younger cohort, we include both those with and without living parents. Phone surveys were used to contact migrant children. Such data are critical to our analysis of the intergenerational dynamics of pension enrollment. Data characterizing villages were also collected as part of the survey. Home villages can be important for enrollment decisions among the rural elderly.

Our analytical sample is restricted to individuals who are over age 45 and eligible for NRPS enrollment (i.e. holding rural registration). We analyze the sample by two age

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[11] Hong Kong, Macao, Taiwan, Xinjiang, Qinghai, Inner Mongolia, Ningxia, and Hainan are excluded.
[12] Because the NRPS rolled-out in most counties between 2010 and 2012, very few counties had initiated the program when the CFPS 2010 baseline sample was collected. Therefore, this current study uses only the CFPS 2012 sample.

categories, i.e., individuals over age 60 who have children (4,332 observations) and those aged 45–60 (6,092 observations, of whom 38.2 percent have no senior parents alive), to capture differing incentives to enroll and to contribute to the system. Except reporting the percentage that enrolls, we do not analyze the 142 childless older persons in our sample as the size is too small.

4.2 Variables

Outcome measures. As indicated above, we examine three decisions related to enrollment in the NRPS: *the decision to enroll*, an individual's *premium paid*, and the *decision time to enrollment*. See Table 1 for summary statistics and Figure 1 for distributions by age. *The decision to enroll* is a binary variable, equal to 1 if an individual has enrolled and zero otherwise. The NRPS enrollment rate is, on average, 54.3 percent among the younger cohort and 60.2 percent[13] among the older cohort. An individual's *premium paid* is the level of individual contribution, ranging from zero to 7,200 CNY per year per person. The average pension premium, including those who do not enroll in the NRPS, is 91 CNY per year per person among all people age 45–60. The average pension premium among enrollees is 162 CNY per year per person. *Decision time* measures the years taken for an individual to enroll after the program became available at their county.[14] This is calculated from the date of program initiation in their county to the date of their enrollment. We use the rollout dates for all counties listed in county-level official documents provided by China's Ministry of Human Resources and Social Security (Appendix Figure 3). Table 1 suggests that the younger cohort (aged 45–60) wait only slightly longer to make pension enrollment decisions compared to their older counterparts, which is consistent with the *Family Binding Policy* that requires older parents and at least one of their eligible children to enroll at the same time.

Control variables. Factors at the individual, family, and village level that may influence pension enrollment decisions are included in regressions. See Tables 2A and 2B for the list of covariates for the older cohort and Tables 3A–3C for that of the younger cohort. We control for somewhat different sets of variables due to the design of NRPS as discussed above.

Individual level variables. In both groups, we control for: age, gender, whether the individual is a household head, marital status, own and children's years of education, party membership, presence of chronic disease and impairment in activities of daily living (ADL), migration status (if outside the local county in the past year), enrollment in the New Cooperative Medical Scheme (NCMS)[15] and enrollment in ORPS. For both groups, trust in government is measured by three binary indicators, from low (responses

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[13] The 59.5 percent older adults enrolling is very close in value to the enrollment rate of their children (63.8 percent, see Table 1). Their slightly higher enrollment rate than their parents suggests that some older parents may not be informed about their children's enrollment status.

[14] For those who did not enroll, their decision time is defined as the difference between the county level rollout date and the date of the interview. The results for premium paid and decision timing are not sensitive to exclusion of those who did not enroll by the survey date.

[15] Since its rollout in 2003, NCMS has rapidly expanded its coverage, service use, cost control and quality. NCMS is now a cornerstone of China's rural health system (Meng and Xu 2014).

of 0–3), medium (4–6), to strong (7–10); the lowest category is the omitted comparison group. For those aged 45–60, we also control for age groups 45–50 (omitted group), 50–55 and 55–60 using binary indicators.

Family characteristics. For the older cohort, we control for household size, whether their spouses are age-eligible for pension benefits (no spouse as the comparison group), years of schooling of their most educated child, number of children in each age group, and the relationship with their children. For the younger cohort, we control for the existence of elderly parents, and then for those with at least one living elderly parent, parents' characteristics (e.g. age categories interacted with gender). We do not control for their relationship with parents as 38.2 percent of them have no parents alive. For both groups, we also control for: house value, land size, number of sons, whether all the children are out-migrants or not, and family income (excluding pension) in quintiles. See Appendix Table 1 for information on income quintiles; note that the bottom three quintiles were below the international poverty line at the time of the survey.[16]

Village characteristics. We also control for village factors, including income per capita and time since the first villager received a pension payment. We also control for geographic access to health care and population size at the village level.

4.3 Empirical Approach

In our empirical analysis, we determine the extent to which the factors discussed in Section 3 explain enrollment decisions as predicted. We analyze three enrollment outcomes: the decision to enroll (extensive margin), the time to enrollment, and premium paid (these latter operate on the intensive margin). We estimate linear probability models for the decision to enroll and linear models for other two continuous enrollment outcomes. Specifically, we estimate the following:

$$Pension_{ifv} = \alpha + X_i'\beta + X_f'\gamma + X_v'\theta + \lambda_c + \varepsilon_{ifv} \qquad (1)$$

where $Pension_{ijv}$ is separately each one of the three outcome variables, and Xs are a rich set of covariates at the individual (X_i; i for individual), family (X_f; f for family), and the village level (X_v; v for village). Information at all three levels is key to understanding enrollment decisions. The list of X variables is summarized in section 4.2 and in Table 1. Also, because the NRPS was rolled out at the county level, all regressions account for county-specific heterogeneities by controlling for county fixed effects (λ_c). Standard errors are clustered at the county level. All estimations are weighted to obtain nationally representative results. We present empirical findings separately for the older and younger cohorts, as explained above. In our sensitivity analysis, we test our results across two specifications. Then, using what we determine to be our preferred specification, we separately estimate female and male subsamples to capture gender differences.

5. Empirical Results

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[16] Note also that pension benefits are not counted as income when assessing eligibility for social welfare programs, which rules out the potential concern that people in the lowest income quintile fail to enroll as they may become ineligible for other benefits due to their pension benefits.

In the regression tables for the older individuals, we examine their decision to enroll (Table 2A) and time to enrollment (Table 2B) in NRPS. However, because those over 60 are not required to contribute pension premiums, we cannot examine premiums paid. The full sample results across two specifications are displayed in columns (1) and (2). Specifically, we present column (1) without measures of the relationship between parents and children and column (2) with such measures. Following our main specification in column (1), columns (3) and (4) separately estimate female and male subsamples because children's willingness to contribute financially and through in-person care might differ by gender of the parent.

In the regression tables for the younger individuals, we display the results for the: decision to enroll (Tables 3A), time to enrollment (Table 3B), and premiums paid (Table 3C). We present column (1) with the number of living parents, their gender composition and their age profiles, column (2) removes if all children have migrated away from their parents, and columns (3) and (4) separately estimate female and male subsamples using the same set of variables as column (1).

Individuals 60 and above

Our primary focus is on older persons who have children. And, as noted above, there are too few childless elders over 60 to analyze them, and as such they are eliminated from our sample. Thus, we analyze only those with children. In general, relatively few personal characteristics affect both outcomes across the samples and specifications. Those who are younger among those over 60 years old likely reap greater benefits to enrolling but are no more likely to enroll. Rather surprisingly, neither own education nor that of one's own children significantly promotes either enrollment decision among older persons. This lack of significance may occur as both the parents and children have very low levels of education; 2.22 and 5.08 years respectively for the older and young cohort. Gender is never significant, but when estimates are conducted separately by gender there are a few differences in coefficients. Specifically, older females who are poorer are more likely to enroll and enroll more quickly. Older females with impaired ADL also enroll more quickly. However, no such pattern exists for older males. Contrary to expectations, the set of variables indicating the age categories of one's children are insignificant in both decisions. For example, elderly parents with children in their fifties are no more likely to enroll than others.

However, prior enrollment in other programs, i.e. health insurance (NCMS) and pension program (ORPS), are all significant. The results show that ORPS is a substitute for NRPS both in terms of enrollment (negative coefficients) and time to enrollment (positive coefficients). NCMS is a complement to NRPS in both decisions. These findings are consistent with the function of each of the programs. Having migrated out significantly increases enrollment and reduces time to enrollment. Note that only 1.2 percent of this older group have migrated.

We find scant evidence of *within-couple* coordination to maximize the gains for the family. For example, other things being equal, and compared to unmarried elderly persons, having a spouse above age 60 is not associated with a higher pension enrollment rate, as would be expected.

Out-migration of all children from the home county significantly reduces parental enrollment and increases decision time to enroll, especially in the separate estimates for males (column (4) Table 2). This evidence suggests that low *intergenerational* connectedness may discourage enrollment for males. Out-migration could also suggest that all children are planning to obtain urban Hukou and they therefore delay their premium contributions in anticipation of no required contribution of children registered in urban Hukou. Thus, do not enroll because they anticipate their parents receiving basic benefits without any premium contributions required of them.. However, even if all children obtain urban Hukou, their current enrollment would to benefit their parents as the benefits far exceeds the premiums paid and the net benefits could be shared.

Having a child enroll in NRPS is positively and significantly associated both with NRPS enrollment (Table 2A) and with a shorter time to enrollment (Table 2B). This is an expected mechanistic relationship as stipulated in the *Family Binding Policy*, which requires older persons to have at least one eligible child enrolled in the program if they are to receive benefits.

Only those in the lowest quintile of income are more likely to enroll and enroll more rapidly, while there are no significant impacts for the second and third quintiles of income. This means that a majority of poor older individuals are no more likely to take advantage of NRPS than their richer counterparts.

Village characteristics strongly influence individual pension enrollment decisions in ways that are consistent with the predicted signs. Specifically, individuals' enrollment rates are higher and enrollment is quicker if fellow villagers started to receive pension benefits at an earlier date. This is consistent with peer learning, and perhaps with other factors, such as a strong village leader.

Individuals aged 45-60

Perhaps a more interesting and more complicated decision is that of children of elderly parents. Consistent with expectations, individuals are more likely to enroll when they are closer to the pension eligibility cut-off age. Specifically, age groups 50–55 and 55–60 are more likely to enroll, enroll with less delay, and pay higher premiums compared to the younger age group 45–50.

In this age group as compared to the older group, own education and that of the most educated child play a role in decisions. Specifically, own education increases enrollment. Children's education promotes enrollment and premium paid. Meanwhile, trust in government increases enrollment across all measures.[17] There are some differences across the estimates by gender. For example, being a household head increases enrollment only among females. Suffering from chronic diseases only raises enrollment for males. As we observe for the older cohort, enrolling in NCMS increases pension enrollment rates and reduces the time taken to enroll; however, it is insignificant in premiums paid. In addition, enrolling in ORPS reduces enrollment and premium contribution, and increases decision time. These results suggest that for this

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[17] Our placebo tests replace trust in government by trust in parents, Americans, strangers or neighbors; but none of these is associated with pension enrollment decisions, suggesting that unobserved factors might not drive both trust and individual enrollment decisions. These results are available upon request.

age group, ORPS is a substitute for NRPS and health insurance is a complement as is true for the older cohort.

As was found in the older cohort, there is little evidence of *within-couple* arrangements for the three NRPS enrollment outcomes. There is mixed evidence on the impact of *intergenerational* arrangements on enrollment decisions among children aged 45–59 with parents age-eligible for NRPS. Some of the age categories measuring only father alive (over age 70) or having both parents alive (over age 60) are significant in the expected directions for enrollment and decision time; with the omitted reference group of no parent alive. Specifically, compare to those with no parent alive, having both parents over the age of 70 increases enrollment, and having both parents 60–70 years old reduces the time to enrollment. This is consistent with the idea that an increase in the number of eligible parents heightens the potential gains of NRPS participation for adult children. Meanwhile, compared to those with no living parents, having father alive only (and over age 70) is associated with higher enrollment rate and shorter decision time. Further, parents with more sons significantly reduce pension premiums.

The only significant impacts of income are for males in the third lowest quintiles, indicating that males in only one low income group are more likely to enroll. All the other income variables have insignificant coefficients in the decision to enroll, the time to enrollment, and premiums paid.

It is interesting to note that village effects for this younger cohort are weaker than those for the older cohort. One plausible explanation is that peers may exert stronger influence on older persons compared to the younger generation, who are more educated and are more likely to migrate out; they may adjust their reference groups to those more relevant to their lives.

6. Conclusions and Discussion

We find evidence of low and suboptimal pension enrollment in NRPS by eligible individuals and their families. For the older cohort, few individual-level characteristics are significant in enrollment decisions, but village characteristics play an important role. For the younger cohort, more individual-level characteristics are significant, including own and children's education. Village characteristics are not as important as for the older cohort. For both cohorts, we find little evidence that families make mutually beneficial intra-family enrollment decisions. Our finding of suboptimal enrollment is important as it highlights the need for policies to improve enrollment.

The suboptimal enrollment takes several forms across different populations. Specifically, individuals enrolled in the unsubsidized ORPS could benefit by simply switching to the highly subsidized NRPS program, yet not all do. All childless elderly could enroll in NRPS without any financial risk, yet not all do. There are also benefits to be shared across generations through intra-family transfers, yet these financial gains for the elderly have not been fully utilized. Relatively younger senior parents or senior parents with children approaching pension-eligible age have more to gain than others, but such benefits are not often realized.

Thus, many of China's rural elderly lack the financial support they need in old age, and this problem is likely to remain incompletely addressed due to suboptimal

enrollment. This problem may worsen as the number of adult children migrating to cities is increasing as is the life expectancy of the their parents, leaving older parents without in-person support possibly for many years. To address these challenges, China implemented NRPS in every county in the country. Despite the broad eligibility of the program and the financial gains possible, we find evidence of low and suboptimal participation. Thus, the full gains will not accrue due to the low take-up rates. Many of those who could most benefit from NRPS do not enroll.

Why do people leave money on the table? Low monetary returns to pension enrollment is unlikely to be a viable explanation. This would be particularly unlikely for those without children, for whom it would be costless to receive benefits. It is also unlikely among people who are over 60 years old, because their pension payments would be several times higher than the premiums that would have to be paid by their children. The family unit would be better off with enrollment, and side payments could be made. Also, the operational cost of claiming pension benefits is low in China due to the direct transfers of pension payments to individuals' bank accounts. This might help to explain why we find that migrants do not enroll at a lower rate. Enrollment could remain low due to a lack of understanding about the program and inability to understand the potential gains to intra-family enrollment decisions. These may be due to low education or financial literacy in both generations. Evidence also suggests that distrust in government among the younger cohort may discourage enrollment.

This study has notable strengths including being the first analysis to examine and explore plausible explanations of NRPS suboptimal pension enrollment including a lack of intergenerational, intra-family agreements. The latter is enabled by our linking of data across generations. Also by collecting and matching county administrative data on pension roll-out with individual's pension choices, the study measured the time delay in pension enrollment as compared to the first possible date of enrollment.

Despite the strengths, this study has limitations as well. One limitation is that this is largely a descriptive study. Another limitation is that despite the richness of these data, there are unmeasured factors such as a direct measure of financial literacy. Also, although we have education of the children for both generations, we do not have information on education and other personal characteristics for the parents of the children age 45-59. But because 38 percent of them do not have a living parent the loss of this data is not as concerning.

These findings have policy implications. First, information on the benefits of NRPS to both generations should be clearly conveyed to all, including both parents and their children, at a level that would be understandable to the low level of education of the population. Targeting educated children in some families, if possible, might be the best use of government funds. More generally, a focus on education might help. But such gains could accrue slowly given our results that it is only for the children of the younger cohort that there was find a significant, beneficial effect of education on enrollment decisions. More specific financial literacy for all should be a policy priority. Fellow villagers and village leader may play pivotal role in understanding the system and encouraging enrollment, as least for the older generations. Such efforts should be aimed at the most vulnerable segments of population as they have the greatest need but

nonetheless low enrollment rates.

Second, there is growing evidence that behavioral interventions can encourage enrollment and at low costs. For example, informational nudges have been found effective in improving choices (Choi et al. 2011; Clark et al. 2014; Beshears et al. 2015). Implementing the default of enrolling those eligible in the program and allowing opt-out, if administered effectively, would increase enrollment (Thaler and Sunstein 2009; Thaler 2016; Ho et al. 2017). This would be particularly suitable to childless elders. For elders with multiple children, such a program would be more complex. For example, the government would have to define a default indicating which child would have to enroll on behalf of the parent (e.g. the oldest son). While a default approach alone might cause concern, the opt-out could be implemented.

The insights from this paper may be applied to other developing countries (Wang et al. 2016; Pension Watch 2017). As in China, the percentage of the elderly population in many other developing countries is growing more rapidly than younger cohorts, many of the elderly are poor and undereducated, and children are migrating to cities. Family ties are often strong but perhaps weakening, and social protection systems are weak. Emerging evidence demonstrates the benefits of social pension programs in developing countries, but enrollment rates are low. This problem can limit the economic, health and social benefits of such social pension programs, thus the need for a better understanding of the causes of and solutions to the low enrollment.

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Figure 1 NRPS Enrollment Decisions

Ratio of NRPS enrollment(age>=16)

Notes:Proportion of 80+ age cohort is 1.2%. So they are dropped in the figure.

NRPS premium(age>=16)

Notes:Proportion of 80+ age cohort is 1.2%. So they are dropped in the figure. For people old

NRPS waiting time(age>=16)

Notes:Proportion of 80+ age cohort is 1.2%. So they are dropped in the figure.
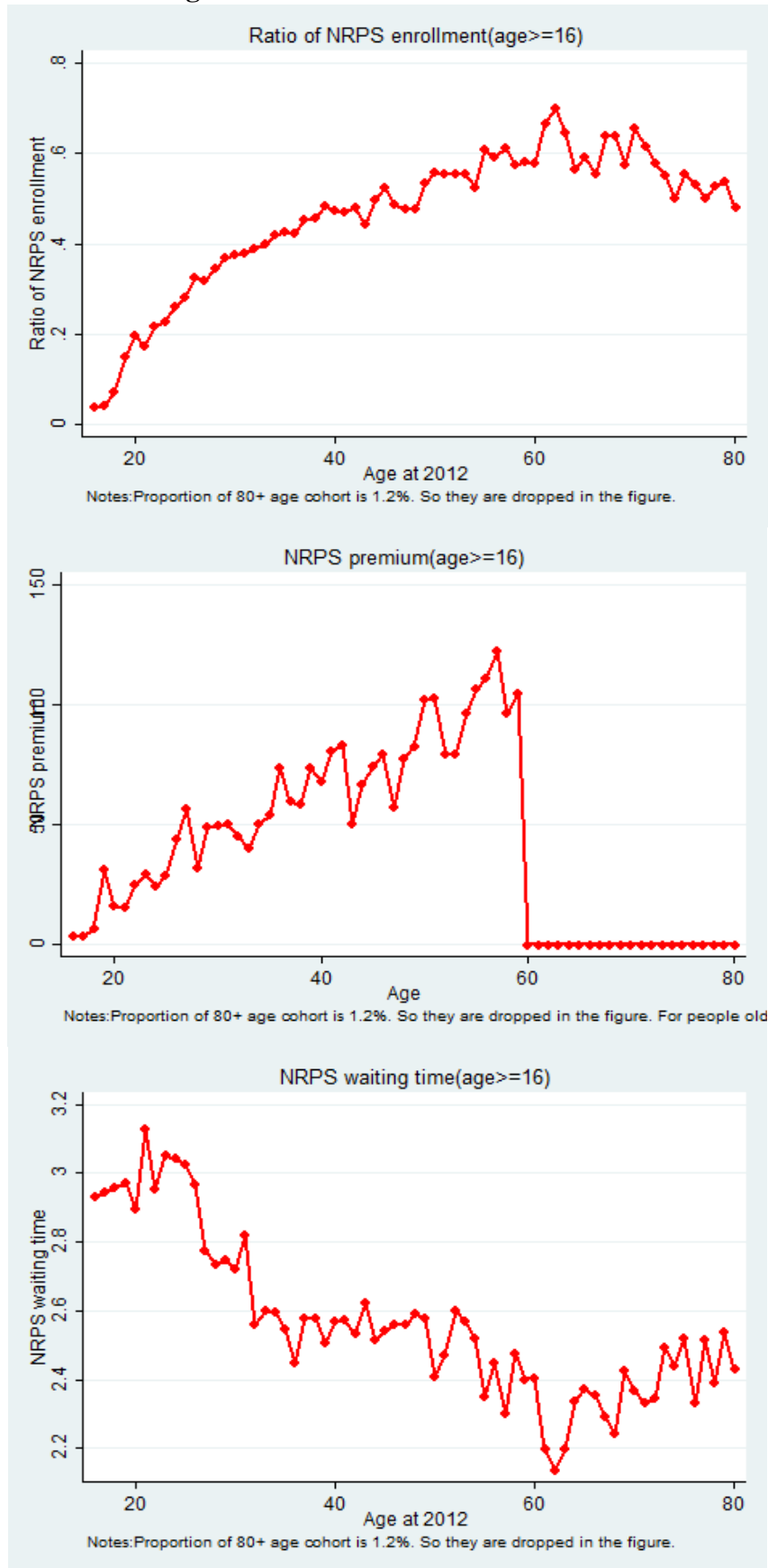
Note: All individuals with zero premium contributions are counted in when generating the average premium by age.

Table 1 Summary Statistics

	age>=45 & age<60					age>=60				
	N	mean	sd	min	max	N	mean	sd	min	max
Whether enroll in NRPS (yes=1,no=0)	6,092	0.543	0.498	0	1	4,332	0.602	0.489	0	1
Premium of NRPS (CNY)	5,799	90.869	269.162	0	7,200					
Decision time of NRPS (years)	5,531	2.494	1.375	0	5	4,067	2.322	1.387	0	5
Individual Characteristics										
Age is [45,50) (yes=1,no=0)	6,092	0.421	0.494	0	1	.	.	.	.	.
Age is [50,55) (yes=1,no=0)	6,092	0.256	0.436	0	1	.	.	.	.	.
Age is [55,60) (yes=1,no=0)	6,092	0.324	0.468	0	1	.	.	.	.	.
Age (year)	6,092	51.502	4.518	45	59	4,332	67.794	6.597	60	99
Male (male=1,female=0)	6,092	0.489	0.500	0	1	4,332	0.491	0.500	0	1
Years of schooling in 2012	6,092	5.077	4.461	0	16	4,332	2.218	3.418	0	16
Household head (yes=1,no=0)	6,092	0.501	0.500	0	1	4,332	0.412	0.492	0	1
Marital status (married=1,single=0)	6,092	0.945	0.228	0	1	4,332	0.783	0.412	0	1
Chronic disease (yes=1,no=0)	6,092	0.135	0.342	0	1	4,332	0.194	0.395	0	1
Activites of Daily Living (ADL) impairment (yes=1,no=0)	6,092	0.061	0.239	0	1	4,332	0.193	0.395	0	1
Party membership (yes=1,no=0)	6,092	0.048	0.213	0	1	4,332	0.076	0.265	0	1
Low trust in government (yes=1,no=0)	6,092	0.253	0.435	0	1	4,332	0.192	0.394	0	1
Medium trust in government (yes=1,no=0)	6,092	0.486	0.500	0	1	4,332	0.474	0.499	0	1
Strong trust in government (yes=1,no=0)	6,092	0.261	0.439	0	1	4,332	0.334	0.472	0	1
Migrant (yes=1,no=0)	6,092	0.055	0.228	0	1	4,332	0.012	0.107	0	1
NCMS health insurance enrollment (yes=1,no=0)	6,092	0.903	0.296	0	1	4,332	0.900	0.300	0	1
ORPS pension enrollment (yes=1,no=0)	6,092	0.059	0.236	0	1	4,332	0.117	0.322	0	1
Family Characteristics										
No spouse (yes=1; no=0)	6,092	0.055	0.228	0	1	4,332	0.217	0.412	0	1
Spouse is below 60 (yes=1,no or single or widow=0)	6,092	0.867	0.340	0	1	4,332	0.125	0.331	0	1
Spouse is above 60 (yes=1,no or single or widow=0)	6,092	0.078	0.269	0	1	4,332	0.659	0.474	0	1
No parent alive (yes=1,no=0)	6,092	0.382	0.486	0	1	.	.	.	.	.
Only mother alive, age [60, 70) (yes=1,no=0)	6,092	0.004	0.060	0	1	.	.	.	.	.
Only mother alive, age 70+ (yes=1,no=0)	6,092	0.082	0.274	0	1	.	.	.	.	.
Only father alive, age [60, 70) (yes=1,no=0)	6,092	0.022	0.147	0	1	.	.	.	.	.
Only father alive, age 70+ (yes=1,no=0)	6,092	0.242	0.428	0	1	.	.	.	.	.
Both father & mother alive, oldest ages [60, 70)	6,092	0.020	0.140	0	1	.	.	.	.	.
Both father & mother alive, oldest ages [70+)	6,092	0.248	0.432	0	1	.	.	.	.	.

	N	mean	sd	min	max	N	mean	sd	min	max
Whether children enroll in NRPS (yes=1,no=0)	.	.	.	.	.	4,332	0.644	0.479	0	1
Number of children age below 45	.	.	.	.	.	4,332	2.184	1.217	0	7
Number of children age [45,60)	.	.	.	.	.	4,332	0.294	0.456	0	1
Number of children age above 60	.	.	.	.	.	4,332	0.041	0.259	0	4
Whether all children are migrants? (yes=1,no=0)	6,092	0.034	0.182	0	1	4,332	0.015	0.122	0	1
Highest years of education of their children	6,092	10.943	3.736	0	22	4,332	9.526	3.641	0	22
Household size	6,092	4.387	1.845	1	17	4,332	4.298	2.143	1	14
Number of sons	6,092	1.142	0.726	0	5	4,332	1.661	0.992	0	6
Number of daughters	6,092	0.970	0.874	0	8	4,332	1.349	1.177	0	6
House value (10,000 CNY)	6,092	14.063	34.126	0	2,000	4,332	14.183	52.670	0	2,000
Land size (1,000 mu)	6,092	0.011	0.036	0	1	4,332	0.010	0.032	0	1
Lowest quantile of income per capita (yes=1,no=0)	6,092	0.194	0.396	0	1	4,332	0.199	0.399	0	1
2nd quantile of income per capita (yes=1,no=0)	6,092	0.196	0.397	0	1	4,332	0.197	0.398	0	1
3rd quantile of income per capita (yes=1,no=0)	6,092	0.202	0.402	0	1	4,332	0.202	0.402	0	1
4th quantile of income per capita (yes=1,no=0)	6,092	0.205	0.404	0	1	4,332	0.199	0.399	0	1
Highest quantile of income per capita (yes=1,no=0)	6,092	0.202	0.401	0	1	4,332	0.204	0.403	0	1
Economic help for children (yes=1,no=0)	.	.	.	.	.	4,332	0.072	0.259	0	1
Housework for children (yes=1,no=0)	.	.	.	.	.	4,332	0.263	0.440	0	1
Take care of grandchildren (yes=1,no=0)	.	.	.	.	.	4,332	0.314	0.464	0	1
Village Characteristics										
Village income per capita (1,000 CNY)	6,092	10.233	5.333	0	68	4,332	9.903	5.347	0	68
Population of the village	6,092	2,179.263	1,823.775	31	23,000	4,332	2,201.181	1,776.094	16	23,300
Time since the 1st villagers receives pension (year)	6,092	1.348	1.131	0	5	4,332	1.419	1.155	0	5
Time to nearest hospital (hour)	6,092	0.194	0.265	0	5	4,332	0.229	0.297	0	5

Dependent Variable: NRPS (yes/no)	(1) All Sample		(2) All Sample		(3) Female Sample		(4) Male Sample	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Individual Characteristics								
Age in 2012	-0.002	0.001	-0.002	0.001	0.000	0.002	-0.002	0.002
Male	0.014	0.016	0.012	0.016				
Years of schooling in 2012	-0.001	0.002	-0.001	0.002	-0.001	0.004	-0.001	0.003
Household head	0.022	0.015	0.021	0.014	0.055**	0.025	0.017	0.026
Chronic disease	-0.001	0.019	-0.001	0.019	-0.006	0.025	0.004	0.026
ADL impairments	-0.028	0.019	-0.029	0.019	-0.027	0.028	-0.037	0.029
Party membership	-0.050*	0.028	-0.049*	0.028	-0.038	0.065	-0.047	0.031
Medium trust in government	0.003	0.018	0.003	0.018	0.001	0.023	-0.001	0.026
Strong trust in government	0.024	0.020	0.025	0.020	0.055*	0.032	0.008	0.025
Migrant	0.153**	0.073	0.148**	0.071	0.315***	0.093	0.119**	0.047
NCMS health insurance enrollment	0.151***	0.037	0.150***	0.037	0.180***	0.048	0.124***	0.047
ORPS pension enrollment	-0.220***	0.044	-0.219***	0.045	-0.186***	0.053	-0.220***	0.055
Family Characteristics								
Within-couple arrangements (reference group=no spouse)								
Whether spouse is below 60	0.074***	0.029	0.070**	0.028	0.066	0.060	0.044	0.043
Whether spouse is above 60	0.022	0.016	0.021	0.016	0.059***	0.022	-0.007	0.027
Intergenerational arrangements								
Number of children age below 45	0.000	0.007	0.001	0.007	0.012	0.009	-0.011	0.010
Number of children age [45,60)	-0.000	0.017	-0.000	0.017	-0.014	0.023	0.008	0.022
Number of children age above 60	-0.012	0.029	-0.015	0.029	-0.010	0.029	0.009	0.033
Number of sons	0.002	0.006	0.002	0.007	0.007	0.009	-0.001	0.008
Whether all children are migrants?	-0.170**	0.078	-0.171**	0.077	-0.066	0.077	-0.261***	0.100
Economic help for children			0.051	0.036				
Housework for children			-0.011	0.014				

	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Take care of grandchildren			-0.010	0.014				
Other Family Characteristics								
Whether children enroll in NRPS	0.419***	0.040	0.421***	0.041	0.395***	0.039	0.441***	0.056
Highest year of education of their children	0.004	0.003	0.004	0.003	0.003	0.003	0.004	0.003
Household size	-0.007*	0.004	-0.006	0.005	-0.005	0.005	-0.005	0.006
House value (10,000 CNY)	-0.000	0.000	-0.000	0.000	0.000	0.000	-0.000	0.000
Land size(1,000 mu)	-0.220	0.343	-0.216	0.338	0.389	0.452	-0.591	0.416
Lowest quintile of income per capita	0.098***	0.026	0.098***	0.026	0.141***	0.037	0.058	0.038
2nd quintile of income per capita	-0.034	0.029	-0.032	0.029	-0.021	0.040	-0.060*	0.036
3rd quintile of income per capita	-0.022	0.031	-0.022	0.031	0.023	0.044	-0.074*	0.041
4th quintile of income per capita	-0.015	0.027	-0.017	0.028	0.014	0.035	-0.052	0.038
Village Characteristics								
Fellow Villagers' Influences								
Time since the 1st villagers receives pension	0.063***	0.017	0.063***	0.017	0.072***	0.017	0.057**	0.023
Other Village Characteristics								
Village income per capita(1,000yuan)	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002
Population of the village	-0.000	0.000	-0.000	0.000	-0.000	0.000	-0.000	0.000
Time to nearest hospital(hour)	-0.037	0.026	-0.038	0.026	-0.048*	0.029	-0.028	0.036
Number of observations	4,332		4,332		2,206		2,126	
Adjusted R2	0.598		0.599		0.631		0.578	

Notes: Linear probability models are used in estimations. All covariates are shown in the table. Standard errors are clustered at the county level. NRPS = 1 if one enrolls in. All sample means combining the male and female samples. All income measures exclude pension benefits. Migration status is defined as being outside the local county in the past year. Coef = Coefficient, SE = Standard Error. *10% significance level. **5% significance level. ***1% significance level

Dependent Variable: Decision time (year)	(1) All Sample		(2) All Sample		(3) Female Sample		(4) Male Sample	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Individual Characteristics								
Age in 2012	-0.002	0.004	-0.002	0.004	-0.007	0.006	-0.000	0.004
Male	-0.040	0.038	-0.041	0.038				
Years of schooling in 2012	0.002	0.006	0.002	0.006	0.003	0.011	0.001	0.008
Household head	-0.042	0.037	-0.038	0.036	-0.042	0.062	-0.072	0.049
Chronic disease	-0.018	0.038	-0.014	0.038	-0.034	0.043	-0.002	0.069
ADL impairments	0.092**	0.044	0.093**	0.044	0.137**	0.062	0.030	0.082
Party membership	0.083	0.074	0.085	0.073	-0.034	0.103	0.126	0.083
Medium trust in government	-0.007	0.061	-0.008	0.061	-0.026	0.059	-0.020	0.094
Strong trust in government	-0.096	0.064	-0.094	0.064	-0.115	0.081	-0.071	0.080
Migrant	-0.205*	0.112	-0.199*	0.106	-0.589**	0.245	-0.246**	0.096
NCMS health insurance enrollment	-0.261***	0.062	-0.259***	0.062	-0.153*	0.083	-0.387***	0.085
ORPS pension enrollment	0.415***	0.089	0.416***	0.091	0.362***	0.085	0.483***	0.166
Family Characteristics								
Within-couple arrangements (reference group=no spouse)								
Whether spouse is below 60	-0.083	0.073	-0.079	0.074	-0.033	0.153	-0.081	0.090
Whether spouse is above 60	0.025	0.042	0.027	0.041	0.001	0.060	0.026	0.053
Intergenerational arrangements								
Number of children age below 45	-0.000	0.021	0.000	0.021	-0.006	0.023	0.009	0.024
Number of children age [45,60)	0.001	0.049	-0.003	0.049	0.099	0.074	-0.089	0.055
Number of children age above 60	0.034	0.058	0.036	0.058	0.045	0.083	-0.054	0.060
Number of sons	-0.002	0.018	-0.002	0.018	-0.023	0.024	0.018	0.022
Whether all children are migrants?	0.160	0.171	0.157	0.172	-0.055	0.171	0.328*	0.184
Economic help for children			-0.087	0.068				
Housework for children			0.034	0.050				

Take care of grandchildren					-0.041	0.042		
Other Family Characteristics								
Whether children enroll in NRPS	-0.602***	0.080	-0.603***	0.080	-0.539***	0.074	-0.648***	0.121
Highest year of education of their children	-0.008	0.007	-0.008	0.007	-0.010	0.008	-0.006	0.008
Household size	-0.000	0.010	0.001	0.010	0.002	0.011	-0.007	0.014
House value	-0.000	0.000	-0.000	0.000	0.000	0.000	-0.000	0.000
Land size	0.620	0.390	0.595	0.392	0.644	0.762	0.386	0.493
Lowest quintile of income per capita	-0.174***	0.058	-0.174***	0.058	-0.249***	0.082	-0.083	0.069
2nd quintile of income per capita	0.037	0.056	0.034	0.056	0.002	0.064	0.105	0.082
3rd quintile of income per capita	0.013	0.057	0.013	0.057	-0.024	0.083	0.082	0.076
4th quintile of income per capita	-0.097	0.066	-0.094	0.067	-0.147**	0.071	-0.022	0.107
Village Characteristics								
Fellow Villagers' Influences								
Time since the 1st villagers receives pension	-0.296***	0.046	-0.296***	0.047	-0.316***	0.051	-0.249***	0.060
Other Village Characteristics								
Village income per capita	-0.004	0.004	-0.004	0.004	-0.007	0.006	-0.004	0.005
Population of the village	-0.000	0.000	-0.000	0.000	-0.000	0.000	-0.000	0.000
Time to nearest hospital	-0.120**	0.055	-0.121**	0.055	-0.119	0.079	-0.054	0.080
Number of observations	3,818		3,818		1,944		1,874	
Adjusted R2	0.441		0.442		0.484		0.445	

Notes: Linear regression models are used in estimations. NRPS decision time is defined as the time gap between enrollment date (or date of interview for non-participants) and county level rollout date. Other notes follow Table 2A.

Table 3A Whether Enrolled (yes/no, for age>=45 & age<60)

Dependent Variable: NRPS (yes/no)	(1) All Sample		(2) All Sample		(3) Female Sample		(4) Male Sample	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Individual Characteristics								
Age is [50,55)	0.066***	0.020	0.065***	0.020	0.106***	0.024	0.031	0.028
Age is [55,60)	0.090***	0.024	0.089***	0.023	0.120***	0.030	0.067**	0.027
male	-0.018	0.018	-0.018	0.018				
Years of schooling in 2012	0.003**	0.002	0.003**	0.002	0.004	0.003	0.003	0.003
Household head	0.015	0.015	0.015	0.015	0.071**	0.028	-0.030	0.027
Chronic disease	0.043**	0.020	0.042**	0.020	0.026	0.023	0.070**	0.035
ADL impairments	-0.052	0.034	-0.051	0.034	-0.014	0.037	-0.084*	0.049
Party membership	0.071**	0.034	0.071**	0.034	0.122	0.082	0.069*	0.039
Medium trust in government	0.030	0.019	0.030	0.019	0.019	0.027	0.046	0.028
Strong trust in government	0.061**	0.024	0.061***	0.024	0.046	0.029	0.076**	0.032
Migrant	0.012	0.029	0.013	0.029	-0.007	0.070	0.017	0.034
NCMS health insurance enrollment	0.268***	0.044	0.267***	0.044	0.286***	0.054	0.254***	0.050
ORPS pension enrollment	-0.215***	0.049	-0.215***	0.049	-0.220***	0.057	-0.218***	0.055
Family Characteristics								
Within-couple arrangements (reference group=no spouse)								
Whether spouse is below 60	-0.014	0.030	-0.013	0.030	0.035	0.046	-0.040	0.041
Whether spouse is above 60	0.002	0.038	0.003	0.038	0.031	0.050	0.040	0.077
Intergenerational arrangements (reference group=no parent alive)								
Only mother alive, age [60, 70)	-0.024	0.053	-0.023	0.053	-0.058	0.083	0.073	0.078
Only mother alive, age 70+	0.010	0.018	0.010	0.018	-0.016	0.029	0.038*	0.023
Only father alive, age [60, 70)	0.041	0.101	0.045	0.099	0.062	0.122	-0.106	0.211
Only father alive, age 70+	0.051*	0.028	0.051*	0.028	0.073*	0.043	0.038	0.034

Both father & mother alive, oldest ages [60, 70)	0.040	0.043	0.038	0.043	0.078	0.059	0.013	0.058
Both father & mother alive, oldest ages [70+)	0.046***	0.017	0.046***	0.017	0.018	0.028	0.079***	0.025
Number of sons	-0.001	0.013	-0.001	0.013	-0.006	0.017	0.005	0.014
Whether all children are migrants?	0.051	0.045			0.082	0.055	0.037	0.045
Other Family Characteristics								
Highest year of education of their children	0.006**	0.003	0.006**	0.003	0.006*	0.003	0.008**	0.004
Household size	-0.006	0.004	-0.005	0.004	-0.005	0.005	-0.007	0.006
House value	-0.000	0.000	-0.000	0.000	0.000	0.000	-0.000	0.001
Land size	-0.171	0.194	-0.176	0.193	-0.085	0.324	-0.198	0.223
Lowest quintile of income per capita	-0.005	0.026	-0.004	0.026	-0.018	0.036	0.004	0.039
2nd quintile of income per capita	0.040	0.027	0.041	0.027	0.019	0.037	0.054	0.037
3rd quintile of income per capita	0.057**	0.026	0.057**	0.026	0.045	0.041	0.072**	0.033
4th quintile of income per capita	0.021	0.028	0.021	0.028	0.011	0.039	0.019	0.032
Village Characteristics								
Fellow Villagers' Influences								
Time since the 1st villagers receives pension	0.002	0.019	0.002	0.019	-0.002	0.024	0.006	0.018
Other Village Characteristics								
Village income per capita	0.004	0.002	0.004	0.002	0.006**	0.003	0.001	0.002
Population of the village	-0.000	0.000	-0.000	0.000	-0.000	0.000	0.000	0.000
Time to nearest hospital	-0.024	0.029	-0.024	0.029	-0.055	0.044	0.032	0.036
Number of observations	6,092		6,092		3,112		2,980	
Adjusted R2	0.351		0.351		0.343		0.357	

Notes: Follow Table 2.

Dependent Variable: Decision time (year)	(1) All Sample		(2) All Sample		(3) Female Sample		(4) Male Sample	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Individual Characteristics								
Age is [50,55)	-0.071	0.047	-0.070	0.047	-0.143**	0.067	0.008	0.046
Age is [55,60)	-0.176***	0.050	-0.175***	0.050	-0.266***	0.070	-0.090	0.057
male	0.036	0.039	0.036	0.039				
Years of schooling in 2012	-0.007*	0.004	-0.007*	0.004	-0.010	0.006	-0.006	0.005
Household head	-0.027	0.030	-0.027	0.030	-0.102*	0.057	0.051	0.052
Chronic disease	-0.055	0.042	-0.055	0.042	-0.020	0.053	-0.135**	0.065
ADL impairments	0.074	0.059	0.074	0.059	0.002	0.064	0.151*	0.091
Party membership	-0.054	0.059	-0.054	0.059	-0.196	0.171	-0.032	0.070
Medium trust in government	-0.080**	0.037	-0.080**	0.037	-0.061	0.049	-0.113**	0.050
Strong trust in government	-0.092*	0.053	-0.092*	0.053	-0.043	0.066	-0.144**	0.060
Migrant	0.027	0.055	0.027	0.055	-0.009	0.136	0.060	0.070
NCMS health insurance enrollment	-0.501***	0.088	-0.500***	0.088	-0.612***	0.125	-0.389***	0.090
ORPS pension enrollment	0.416***	0.092	0.416***	0.092	0.426***	0.111	0.421***	0.095
Family Characteristics								
Within-couple arrangements (reference group=no spouse)								
Whether spouse is below 60	0.076	0.055	0.076	0.056	0.004	0.078	0.117	0.079
Whether spouse is above 60	-0.005	0.084	-0.005	0.084	-0.039	0.102	-0.034	0.151
Intergenerational arrangements (reference group=no parent alive)								
Only mother alive, age [60, 70)	0.056	0.121	0.055	0.121	0.048	0.212	0.031	0.132
Only mother alive, age 70+	-0.022	0.033	-0.023	0.033	0.027	0.053	-0.070	0.050
Only father alive, age [60, 70)	-0.091	0.229	-0.093	0.227	-0.108	0.315	0.116	0.290
Only father alive, age 70+	-0.095*	0.053	-0.095*	0.053	-0.093	0.079	-0.108	0.071

	(1)		(2)		(3)		(4)	
Both father & mother alive, oldest ages [60, 70)	-0.196*	0.108	-0.196*	0.108	-0.350*	0.184	-0.025	0.092
Both father & mother alive, oldest ages [70+)	-0.057	0.036	-0.057	0.036	-0.044	0.053	-0.075	0.055
Number of sons	-0.002	0.019	-0.003	0.019	0.018	0.030	-0.037*	0.021
Whether all children are migrants?	-0.031	0.068			-0.104	0.102	0.030	0.079
Other Family Characteristics								
Highest year of education of their children	-0.007	0.005	-0.007	0.005	-0.006	0.005	-0.010	0.007
Household size	0.005	0.009	0.005	0.009	-0.000	0.011	0.007	0.011
House value	-0.000	0.000	-0.000	0.000	-0.001	0.001	0.001	0.001
Land size	0.165	0.362	0.168	0.361	-0.121	0.455	0.257	0.394
Lowest quintile of income per capita	0.096*	0.058	0.096*	0.058	0.146*	0.075	0.059	0.080
2nd quintile of income per capita	0.057	0.047	0.057	0.047	0.081	0.059	0.073	0.073
3rd quintile of income per capita	-0.028	0.060	-0.028	0.060	0.029	0.075	-0.099	0.076
4th quintile of income per capita	0.031	0.048	0.031	0.048	0.068	0.071	0.019	0.064
Village Characteristics								
Fellow Villagers' Influences								
Time since the 1st villagers receives pension	-0.008	0.069	-0.007	0.069	-0.001	0.077	-0.018	0.060
Other Village Characteristics								
Village income per capita	-0.004	0.007	-0.004	0.007	-0.010	0.009	0.004	0.006
Population of the village	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Time to nearest hospital	-0.046	0.066	-0.046	0.066	-0.021	0.072	-0.106	0.094
Number of observations	5,531		5,531		2,803		2,728	
Adjusted R2	0.323		0.323		0.326		0.340	

Notes: Follow Table 2.

Table 3C Premium Paid (CNY, for age>=45 & age<60)

Dependent Variable: Premium (CNY)	(1) All Sample		(2) All Sample		(3) Female Sample		(4) Male Sample	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Individual Characteristics								
Age is [50,55)	32.858*	19.375	33.205*	19.262	28.471	23.704	34.230**	17.333
Age is [55,60)	49.188***	18.807	49.580***	18.554	31.863	26.009	52.066***	18.656
male	-19.433	22.881	-19.422	22.883				
Years of schooling in 2012	2.258	1.539	2.260	1.539	0.059	2.476	2.104	1.750
Household head	-1.648	24.197	-1.710	24.305	27.953	29.728	-35.512	33.742
Chronic disease	-24.477	15.926	-24.510	15.968	-42.606**	20.592	-12.938	30.526
ADL impairments	-34.169	23.731	-34.482	23.923	-30.077	37.112	-36.982**	18.724
Party membership	-7.682	15.089	-7.579	15.031	-31.661	34.840	6.448	19.575
Medium trust in government	-3.108	22.883	-3.108	22.897	-20.308	43.662	18.580	20.396
Strong trust in government	24.634*	14.759	24.729*	14.788	-1.549	24.539	55.062*	28.820
Migrant	-31.546	28.722	-31.597	28.812	-10.682	42.772	-52.568*	31.401
NCMS health insurance enrollment	-364.353	184.616	-364.379	184.582	-218.531	199.779	-525.710*	281.339
ORPS pension enrollment	-97.011*	53.301	-97.037*	53.305	-227.444	162.930	12.213	36.324
Family Characteristics								
Within-couple arrangements (reference group=no spouse)								
Whether spouse is below 60	18.902	27.482	18.804	27.442	54.287	34.419	-24.887	42.621
Whether spouse is above 60	24.674	35.547	24.792	35.593	68.397*	40.104	-79.357*	43.465
Intergenerational arrangements (reference group=no parent alive)								
Only mother alive, age [60, 70)	-105.350	83.492	-106.073	85.147	-59.435	60.419	-140.009	139.743
Only mother alive, age 70+	-26.371	24.387	-26.593	24.764	-37.556	25.183	-5.126	27.952
Only father alive, age [60, 70)	-22.187	37.238	-21.589	37.108	-31.509	81.044	41.743	52.057
Only father alive, age 70+	8.406	19.764	8.303	19.754	16.404	29.498	-2.463	23.172

	(1)		(2)		(3)		(4)	
Both father & mother alive, oldest ages [60, 70)	-12.906	24.124	-12.363	23.850	-68.062	46.725	-5.183	33.500
Both father & mother alive, oldest ages [70+)	9.768	15.251	9.769	15.243	16.400	23.817	16.673	19.087
Number of sons	-44.953**	20.742	-45.129**	21.021	-42.776*	24.860	-45.932**	22.075
Whether all children are migrants?	-10.954	29.916			-2.912	20.803	-47.301	57.308
Other Family Characteristics								
Highest year of education of their children	4.374***	1.431	4.404***	1.416	6.312***	2.322	4.178**	2.054
Household size	-2.843	2.858	-2.892	2.885	-3.563	3.915	-3.360	4.220
House value	-0.385	0.542	-0.384	0.541	-0.425	0.721	-0.189	0.486
Land size	-233.080*	135.996	-230.551*	133.236	-238.700	170.958	-303.694	315.958
Lowest quintile of income per capita	-21.594	42.750	-21.526	42.675	-23.168	49.775	-9.945	43.170
2nd quintile of income per capita	-29.042	30.390	-29.075	30.454	-5.172	39.897	-45.121	42.214
3rd quintile of income per capita	-19.344	27.171	-19.304	27.149	-5.707	41.924	-35.263	30.494
4th quintile of income per capita	-26.117	34.641	-26.135	34.688	-5.325	57.108	-40.883	35.180
Village Characteristics								
Fellow Villagers' Influences								
Time since the 1st villagers receives pension	97.016	72.921	97.029	72.949	122.635	88.205	71.064	74.263
Other Village Characteristics								
Village income per capita	6.735	5.513	6.726	5.494	9.437	6.172	4.743	5.470
Population of the village	0.001	0.010	0.001	0.010	-0.010	0.010	0.006	0.015
Time to nearest hospital	35.172*	20.688	35.506*	21.086	64.306*	35.197	-13.075	26.644
Number of observations	3,018		3,018		1,562		1,456	
Adjusted R2	0.361		0.361		0.371		0.369	

Notes: These estimations only use the subsample of enrollees (i.e. premium paid>0). Other notes follow Table 2.

Appendix

Appendix Figure 1 – Statistics on the Rural Pension System in China (2002-2014)

Number of Contributors and Beneficiaries (10,000 persons)
New Rural Pension Scheme in China, 2002-2014

Fund Expenses and Fund Balance (100 million yuan)
New Rural Pension Scheme in China, 2002-2014
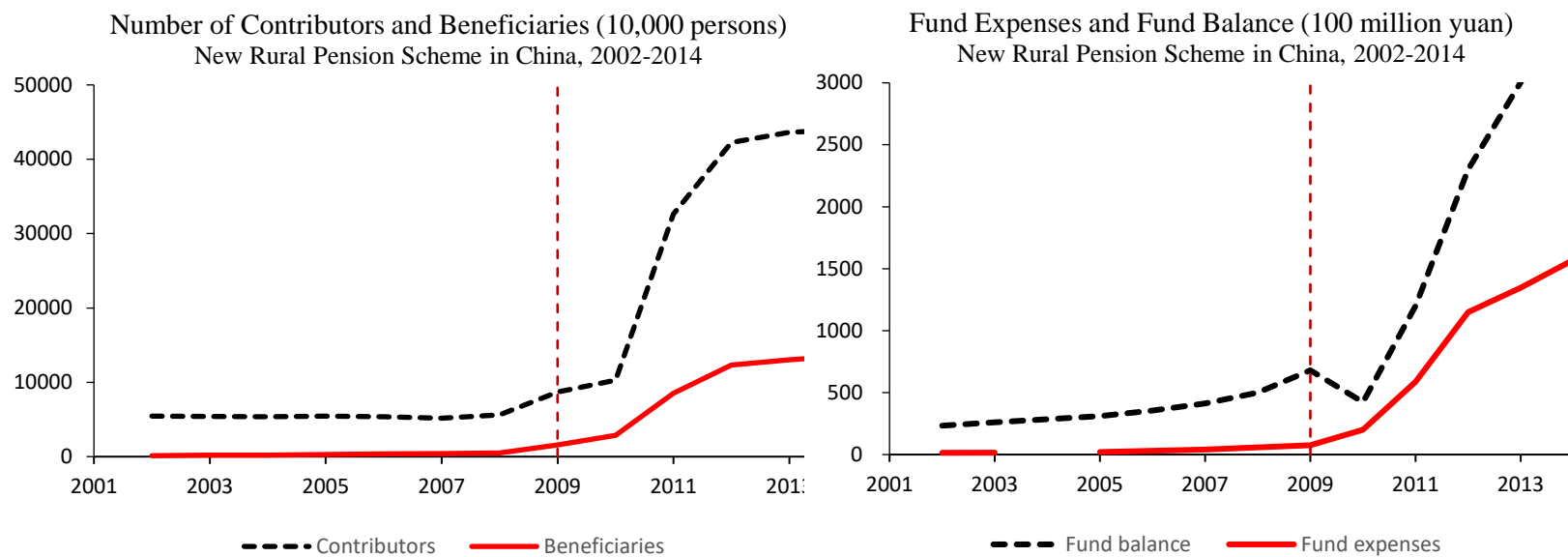
Source: China Labor Statistical Yearbooks (2004-2014), Statistical Bulletin on the Social Development of Human Resources and Social Security (2002-2014).

Notes: The NRPS initiated at the end of 2009. The non-zero figures before 2009 represent the unsubsidized ORPS that covered a tiny proportion of rural residents, mainly in developed regions in China.

Appendix Figure 2 – Pension Enrollment Rate by Age and Type of Pension

Enrollment Rate by Age and Types of Pension

Notes: Proportion of 80+ age cohort is 1.2%. So they are dropped in the figure.

Notes: Only 1.2 percent of respondents are above age 80, and they are excluded from this figure. Other pensions mainly include commercial pension and pension subsidy to the oldest of old, and a tiny proportion of enterprise employee pension or government and public institution employee pension. Having commercial pensions or pension subsidy to the oldest of old does not preclude people from enrolling in NRPS. Note that there is no policy regarding potential reduced benefits if one enrolled in more than one of these programs. While the unsubsidized ORPS is still in operation (but not accepting new enrollment) and people are not allowed to enroll in NRPS and ORPS at the same time, rational agents should simply switch from this program to the highly subsidized NRPS with higher return and lower risk.

Appendix Figure 3 – The Rollout of New Rural Pension Scheme in China
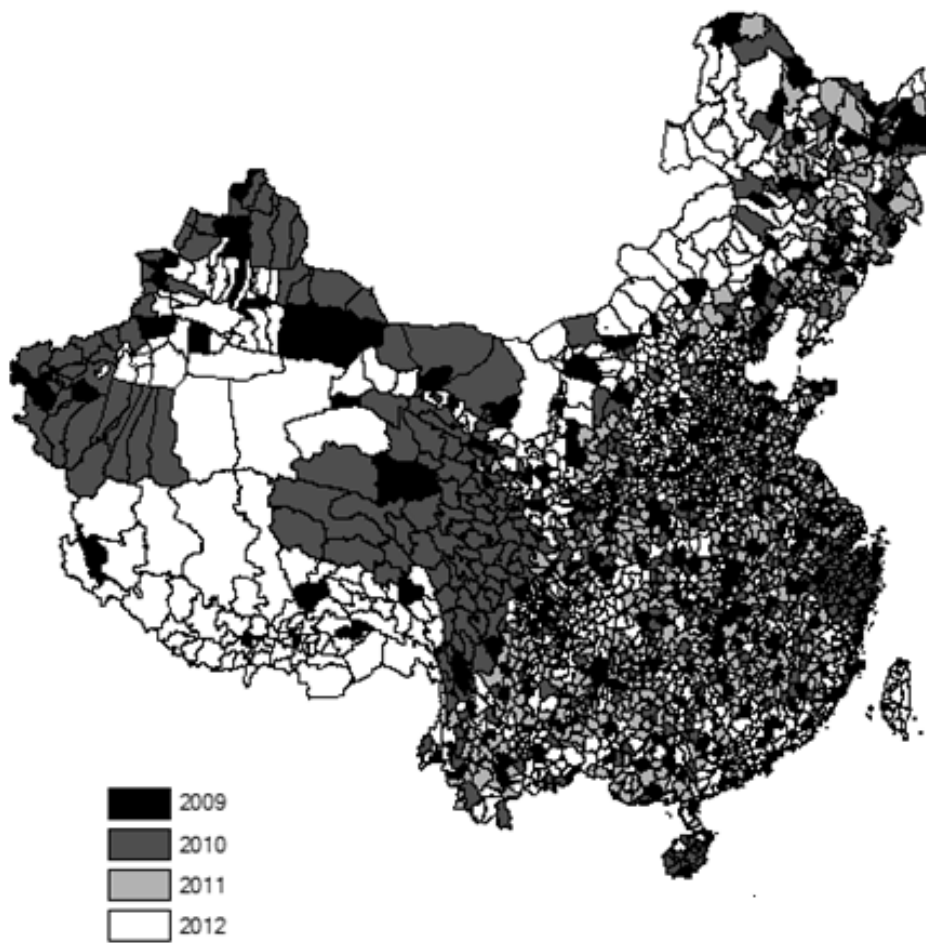
Notes: The NRPS was rolled out at the county level between 2009-2012.

Appendix Table 1 - Summary Statistics of Income per capita by quintile (for those age >45)

	N	mean	Sd	min	max
Income per capita (1000 CNY)					
Lowest quintile	1,360	0.082	0.706	-12.2	0.5
2nd quintile	1,361	1.004	0.314	0.5	1.6
3rd quintile	1,364	2.713	0.769	1.6	4.2
4th quintile	1,361	7.343	2.246	4.2	12.0
Highest quintile	1,357	29.552	30.507	12.0	500.0

Data: CFPS (2012)

Notes: The 1.90 USD international poverty line corresponds to 4,577 CNY per person per year (1 USD = 6.60 CNY). Therefore, all individuals in the lowest three income quintiles were below the international poverty line at the time of survey.